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IN A RECENT NUMBER of *Science* it was stated that cholera did not seem to be very active in Italy, although it had extended thence to Trieste and Fiume. From here it has invaded Carmola and Croatia. At Lie, a village of Croatia, it seems to have awakened to new life, developed doubtless by reason of the unsanitary condition in which it has found the inhabitants of that place, some nine hundred in number. Although it seems to have but just appeared in that place, ninety persons are reported as having contracted the plague, of which number twenty-eight are already dead. It will be seen from this that the disease must be of a very virulent type. The excitement among the people is said to be intense and uncontrollable. The scenes which were enacted in Spain during the epidemic which ravaged that country are being repeated in Croatia. The physicians are being stoned, and wives and children deserted. The superstition of these people is so great that almost any form of barbarity may be expected. The matter begins to have a serious aspect for central Europe, when cholera in a virulent form has obtained so firm a foothold in Austria; and, if the disease continues to spread, something like a panic may be anticipated. If the report of the appearance of cholera at Pesth is confirmed, the danger is greatly increased, as the onward march of this epidemic disease is greatly favored, when it reaches cities situated upon rivers which are great highways of travel.

THE FEVER which broke out in Biloxi, Harrison county, Miss., in August last, has occasioned great excitement and alarm throughout the length and breadth of the Mississippi valley. The opinion was expressed by us at that time, that it was undoubtedly yellow-fever. This was based upon our knowledge of the skill and experience of Dr. Joseph Holt, president of the Louisiana state board of health, who declared the disease to be of that nature. This opinion has been controverted by the physicians of Biloxi, which is not a matter of surprise, and also, as appears in the daily press, by the physicians of the U. S. marine hospital service. We have just received from Dr. Holt a detailed account of the outbreak and its subsequent history, and are more convinced than ever that the citizens of Biloxi have had true yellow jack in their midst, and that, if the disease is now under control, that result has been attained by the vigorous action of the Louisiana board in

instituting a quarantine against the infected city. Had this not been done, the existence of the fever would probably have been concealed until it had obtained such a hold that months rather than weeks would have elapsed before it was conquered. It is a sad commentary on human nature, that not only the people, but even medical men and officials, will attempt to delude themselves into the belief that a pestiferous disease does not exist in their midst, simply to avoid the risks to reputation and commerce which a knowledge of the true state of things would create, when they must know, from an experience which has been repeated over and over again in the past, that concealment or suppression can at best avail nothing, and that such a policy can but result in a wide-spread and probably uncontrollable epidemic, which will cause untold suffering and misery, and increase the mortality a hundred-fold.

THE BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

THE British association meeting is now drawing to a close, and may be said to have been very successful in all respects, but without any great sensation. About twenty-five hundred tickets have been taken for it, and the local arrangements were most complete. A special feature in them is a large exhibition of the manufactured products of this so-called 'workshop of the world.' Great care has been exercised in the selection of the exhibits, which must have been produced within a radius of fifteen miles from the centre of the town, and they illustrate in a remarkable degree the applications of science and art to manufacturing processes. A very large number of firms have also thrown open their works to the inspection of visitors. An unusual number of colonial and American visitors are attending the meeting, among the latter of whom Professor Barker and Prof. Carvill Lewis, both of Philadelphia, are prominent figures. The president, Sir W. Dawson of Montreal, opened the meeting with an address upon "The geology of the Atlantic Ocean and the land on its borders," which, together with the addresses of Prof. G. H. Darwin, president of the section of mathematics and physics, and of Mr. Crookes, president of the chemical section, will be found in full in *Nature* for Sept. 2. The subject of the former was "The value of the unit of geological time, from the point of view of cosmical physics." Mr. Crookes dwelt, in somewhat hypothetical fashion, it is true, with the genesis of the chemical elements, and he suggested a process for their evolution by the gradual cool-

ing of primordial matter termed 'protyle' (analogous to protoplasm), which contained within itself the potentiality of all possible atomic weights. The keynote of the presidential address by Professor Bonney to the geological section was contained in the phrase, "the application of microscopic analysis to discovering the physical geography of bygone ages." In the biological section Mr. Carruthers, the president, drew attention to the past history of those species of plants which still form a portion of the existing flora. Sir F. Goldsmid, who presides over the geographical section, took for his subject "The means of popularizing the study of geography," a contribution to which end is seen in an exhibition of appliances therefor, open during the meeting. In the section of economic science and statistics, Mr. J. Biddulph Martin, in his presidential address, gave an exposition of the claims of this subject to a scientific status. In that of mechanical science, the president, Sir James N. Douglas, dealt with the peculiarly appropriate subject of lighthouses, since probably the largest manufactories of lighthouse apparatus in the world are to be found in Birmingham. Lastly, in the anthropological section, Sir George Campbell recommended from the presidential chair the systematic and scientific cultivation of man with a view to both physical and mental qualities, — 'homi-culture,' in the same sense as oyster-culture, bee-culture, etc.

Turning to the general work of the meeting, it may be remarked that there were, at its commencement, between six hundred and seven hundred papers to be read and discussed in these various sections. Geology seems the most prolific, that section being almost overburdened with work. Two subjects for special discussion were selected some months ago : 1°, 'The theory of color-vision ;' 2°, 'The nature of solution.' The latter was confined to the chemical section, but the former was conducted at a joint meeting of the physical and biological ; and it was remarked at the outset that on no previous occasion had two sections held a joint discussion. The result was so successful, that it is hoped this precedent may be followed. No formal papers were read, but the subject was opened by Lord Rayleigh, who, in a speech of some length, reviewed the theory from the physical point of view. Colors might differ in three ways, — brightness, freedom from dilution with white, and hue : hence, from any four colors and black, a match might be made. He insisted very strongly on the distinction in effect between mixing colors (or paints) and mixing lights. No other known colors than red, violet, and green were 'primary,' though it was possible that some other unknown tints might be the real primary

colors. In the so-called color-blindness, color-vision was usually twofold, or dichroic. All that he said, however, involved the assumption (probably true) that a mixture is more complicated than its ingredients. Dr. König of Berlin followed with an account of a large series of very careful experiments upon elementary sensations of color, — an analysis of color-sensations without any hypothesis, — which led him to the conclusion that the views of Thomas Young as to color, viewed in the light of modern experimental research, were certainly true. Dr. Michael Foster, speaking from the physiological point of view, pointed out to the physicists the difficulty of applying their theories of color, and expounded Hering's theory, according to which colors might be divided into pairs, one of which produced assimilation in the substance of the retina, and the other dissimulation, such as blue and yellow, red and green, and so on. Mr. J. Tennant pointed out that both Hering's and Young's theories had three independent variables, and led to the same general results. As, however, Hering's unquestionably explained the phenomena of simultaneous contrast best, he preferred it on that ground. The discussion came to a premature end, from lapse of time. That upon the nature of solution was opened by Dr. Tilden, who had studied the subject mainly from the point of view of the thermal phenomena occurring at solution. He presented an able summary of our knowledge of the subject, and showed that the solubility of a salt depended mainly on its melting-point, as well as on similarity of constitution between it and the solvent. Dr. Nicol showed experimentally that the molecules of a salt stood in the same relation to all the molecules of the water in which it was dissolved, or, in other words, that salts did not retain their water of crystallization in solution. Dr. Armstrong, Mr. Hartley, and Dr. Gladstone, however, differed from this view, considering that the hypothesis of 'residual affinity,' broached by Helmholtz, afforded a sufficient explanation of observed facts.

At one of the general evening meetings, Professor Rucker delivered a brilliant lecture to a very large audience, upon 'Soap bubbles.' The experimental illustrations, all of which were projected on a screen by the electric light, were of exceeding beauty and invariably successful. The particular point brought before the audience was the thickness and other properties of the black film of the bubble. The unit of measurement employed was the millionth of a millimetre. It was shown that this thickness varied considerably, but that the optical and electrical methods of measurements agreed closely in any particular

case. Generally these black films range from 7.2 to 14.5 units in thickness, so that from 4 to 720 molecules could lie side by side therein, according to the view of the size of molecules adopted. A very extraordinary phenomenon was the sharply marked edge of the black film, a sudden and not a gradual increase of thickness taking place, between it and the colored film. The influence of surface tension and viscosity upon this was discussed, and the important influence of these researches upon the dynamical theory of liquids was insisted upon; the lecturer, who quoted Sir William Thomson in support of his views, considering that in this sharp edge there was experimental evidence, first, of a minimum of surface tension; and, secondly, of an alteration of the nature of force in play between the molecules, which had often been assumed in physical investigations, but of which direct evidence had hitherto been wanting.

A day was devoted to the consideration of electrical subjects from the mechanical or engineering side. A warm discussion took place upon the relative merits of electric light and mineral oil for lighthouses, the general result being, that, even for lights of a low order, the electric light could compete most favorably in every point, as to efficiency, first cost, and cost of maintenance. The balance of evidence brought forward was unquestionably on the side of the electric light as regards fog penetration. On the question of secondary batteries, some remarkable evidence was adduced as to the improvements in detail lately effected therein, which rendered them more practically permanent, and free from disintegration. The most important subject, however, was that of electric safety-lamps for miners' use. Mr. Swan exhibited his latest form, which fulfilled all the conditions laid down two years ago for the Ellis Lever prize. The lamp was self-contained, and, with a current of 0.4 amperes, gave the light of one candle for twelve hours: it weighed five pounds and a half, and its secondary battery was much more simply recharged than an ordinary Davy lamp. Moreover, a most ingenious fire-damp indicator, accurate to within 0.5 per cent, was attached to it. Mr. Swan claimed that it was more efficient, more safe, and more economical, than any miner's lamp in use.

At the general committee meeting held Sept. 6, Sir Henry Roscoe was elected president for the meeting to commence at Manchester on Aug. 31, 1887, and it was agreed to meet in Bath in 1888. An invitation from the government of New South Wales was received for forty or fifty representative members of the association to be present at Sydney in January, 1888, when the centenary of the colony would be celebrated. It was resolved

to entertain the invitation; and the council was empowered to accept it, if, after due inquiry, they were of opinion that a sufficient number of truly representative men would agree to go.

On the night of Sept. 6 a lecture was given to the whole association by Professor Rutherford, who broached that night for the first time what might be termed a 'telephonic theory' of hearing. According to it, the cochlea does not act on the principle of sympathetic vibration, but the hairs of all its auditory cells vibrate to every tone, just as the drum of the ear does; there is no analysis of complex vibrations in the cochlea or elsewhere in the peripheral mechanism of the ear; the hair-cells transform sound-vibrations into nerve-vibrations similar in frequency and amplitude to the sound-vibrations; simple and complex vibrations of nerve energy arrive in the sensory cells of the brain, and there produce, not sound again, of course, but the sensations of sound, the nature of which depends, not upon the stimulation of different sensory cells, but on the frequency, amplitude, and form of the vibrations coming into the cells, probably through all the fibres of the auditory nerve. On such a theory the physical cause of harmony and discord is carried into the brain, and the mathematical principles of acoustics find an entrance into the obscure region of consciousness. Now, if nerve energy were only electricity, that theory would probably be accepted at once; but nerve motion is very sluggish when compared with electricity. The lecturer for five years had kept this theory back, because he felt that he had no evidence of the possibility of sending a rapid succession of vibrations along a nerve. It cost him a good deal of thought and experimental observation to find the evidence he required. In dealing with methods so difficult and obscure, one must beware of dogmatism; but it was the duty of the scientist to frame theories which seemed to explain phenomena. One might and often did err in holding back a theory lest it should give pain to the author of some theory which it was destined to oppose, forgetting that the suggestion of a new line of thought might in some other mind lead to ideas still farther in advance. Should his theory of the sense of hearing find acceptance, it would lead to a reconstitution of theories regarding the other sense-organs. The lecture was successfully illustrated by means of an extensive and elaborate collection of apparatus and diagrams.

THE authorities of Nancy, France, have voted to add 300,000 francs to the 500,000 francs already appropriated by the general government, to be devoted to the construction of chemical and anatomical institutes in that city.